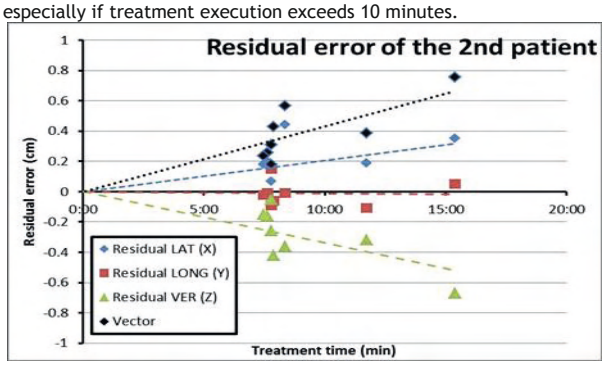
Purpose/Objective: To investigate the advantages in dosimetry, patient comfort and positioning accuracy when using the newly developed Sagittilt® (Orfit Industries, Wijnegem, Belgium) prone breast board.
Materials and Methods: A careful clinical introduction of Sagittilt® has been initiated: Phase 1: pre-clinical treatment planning study and Phase 2: prospective clinical trial (still ongoing). During the pre-clinical phase, 14 patients with breast cancer were scanned in supine and prone position and treatment plans were created to investigate dosimetrical advantages of Sagittilt®. The second phase started with the clinical treatments of (to date) 5 patients in prone position. This early clinical phase focused on patient comfort assessed by an in-house developed questionnaire completed by the patients. Positioning accuracy has been assessed by daily online cone-beam CT acquisition (pre-RT CBCT), followed by a post-RT CBCT in order to investigate stability of positioning over time.
Results: The pre-clinical treatment planning study confirmed non-significant differences on target coverage (V95%-107% of the PTV) and on heart dose, while a significant reduction of the ipsilateral lung and slightly higher dose to the contralateral breast were observed. The early clinical phase eliminated the increased contralateral breast dose, revealed good-excellent patient comfort, while the setup error remained low (individual systematic and random errors were: 0-3 mm and 0.8-2.5 mm). The residual error (ie. the error observed between the two CBCT) could rise up to 7 mm (at the 2nd patient Figure 1.) especially if treatment execution exceeds 10 minutes.



Conclusions: Our methodology for the clinical introduction of Sagittilt® proved to be safe. Our current data showed promising results for dosimetry and positioning accuracy. Special attention should be paid to reduce the overall treatment time to keep residual error as low as possible.

EP-1301
Orthanc - lightweight, scriptable DICOM server for medical image management in radiotherapy
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Purpose/Objective: High-quality radiotherapy (RT) treatment planning requires the combination of information arising from multiple medical imaging modalities. For this reason, RT implies the setup and the management of complex flows of images between the various modalities and software of the hospital. Even though biomedical images are most commonly stored and transferred using the DICOM standard, it remains hard to automatize and optimize these clinical flows that are very specific to each hospital. This stems from the fact that programming the DICOM network protocol requires both a high level of familiarity with the DICOM standard as well as substantial experience in computer programming. This motivates the introduction of the Orthanc software in the medical practice to improve the RT imaging workflow.
Materials and Methods: Orthanc is an open-source, easy-to-use, lightweight and scriptable DICOM store. It takes advantage of the DCMTK toolkit for powerful DICOM handling abilities. Multiple instances of Orthanc can be easily and freely deployed in the hospital network. Orthanc comes bundled with an embedded Web interface that allows the end-users to browse and interact with the content of the DICOM store from any computer. Orthanc can be setup as a bridge between multiple DICOM modalities, which improves the interoperability between proprietary systems by decoupling them. Furthermore, Orthanc features a rich scripting environment: It can be driven from any computer language to automate and optimize clinical processes. Orthanc is written in C++ for maximum speed, and emphasis is put on the quality and the automated validation of its source code.
Results: Orthanc is currently used in our Institution to improve two real-world clinical processes. Firstly, Orthanc is deployed as a buffer for PET scans between Nuclear Medicine (NM) and RT departments. These images are indeed systematically purged from the Treatment Planning System (TPS) on a daily basis. Orthanc enables the RT physicists to immediately find the purged images and restore them back from Orthanc into the TPS on the fly, without any interaction with the NM team, hence accelerating the clinical processes. Secondly, another instance of Orthanc is configured to gather the in-room images that are produced during the RT treatments. This opens the path to the automated assessment of the quality of the patient positioning and to the clinical research about adaptive radiotherapy in our hospital.
Conclusions: The open-source Orthanc software provides medical physicists with a powerful environment to make the image flows more robust and automated in RT departments.

EP-1302
SBRT in prostate cancer: is CyberKnife the only option?
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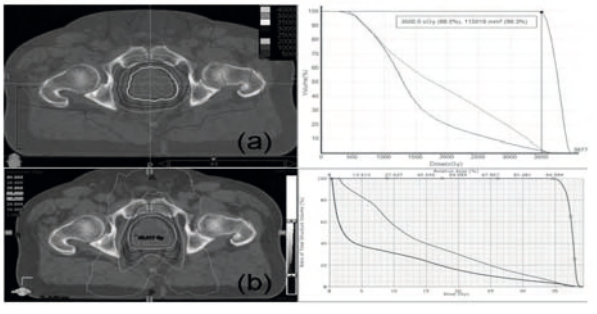
Purpose/Objective: Over recent years, there has been an increasing interest in the use of stereotactic body radiotherapy (SBRT) in the management of low and intermediate risk prostate adenocarcinoma. A number of small studies and single centre series have been published demonstrating biochemical progression free survival rates (bPFS) at 3 to 4 years between 90% - 100%, with long term grade 3 rectal and urinary toxicity no higher than 3%. The majority of these series have used Cyberknife™ (Accuray Inc., Sunnyvale, CA) with an international randomised controlled study underway, comparing SBRT delivered using Cyberknife, to surgery and to conventionally fractionated intensity modulated radiotherapy.
Materials and Methods: Six patients previously treated with conventional radical radiotherapy were selected to represent a typical range of prostate shapes and sizes. Delineation of the prostate alone (CTV) and all organs at risk (OARs) was performed by one consultant clinical oncologist. A margin of 3mm for CyberKnife and 5mm for Rapicarc were used to create PTVs. Plans that deliver at least 35Gy in 5 fractions to at least 99% of the PTV (PTV35Gy>99%) were then created using Accuray Multiplan v.4.5 (Ray-tracing algorithm) and Varian Eclipse v.10 (AAA algorithm). SBRT dose constraints that are typically employed were used to optimise doses to the rectum and bladder without compromising PTV coverage (Rectum V18 <50%, V28 <20% and V36 <1cc; bladder V18 <40%, V37 <10cc). Plans were transferred to a water equivalent phantom and delivered doses were measured for both systems using radiochromic film.
Results: Both planning systems achieved a planned dose PTV heterogeneity of <13% in all six patients. The planned OAR constraints were achieved for all patients for both systems. We aim to dose escalate using both platforms to assess which platform is first to fail the constraints. Figure 1 shows an example of comparison CyberKnife and Rapidarc plans for the same patient.

Figure 1. (a) Cyberknife plan (b) Rapidarc plan.



Conclusions: We have shown that in terms of both planned and delivered dosimetry, Rapidarc is comparable to Cyberknife in SBRT for prostate cancer. The additional benefit of arc therapy is the comparatively short delivery time. In addition there is both a larger availability of radiotherapy centres equipped to deliver arc therapy, and a larger number of arc capable machines within each centre. An international, platform independent, clinical trial is urgently required to confirm an equal clinical benefit with other platforms.